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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,472	12/31/2003	Jeffrey M. Amsden	SP03-159	9871

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EXAMINER	
LEUNG, JENNIFER A	

ART UNIT	PAPER NUMBER
1797	

MAIL DATE	DELIVERY MODE
12/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/750,472	AMSDEN ET AL.	
	Examiner	Art Unit	
	Jennifer A. Leung	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) *7-11* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-11* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 May 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Jennifer A. Leung

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/10/05;12/31/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1-6, in the reply filed on September 26, 2007 is acknowledged. Claims 7-11 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carmello et al. (EP 1110605) in view of Groppi et al. (Simulation of structured catalytic reactors with enhanced thermal conductivity for selective oxidation reactions. *Catalysis Today* 69 (2001) 63-73).

Regarding claims 1, 2 and 6, Carmello et al. discloses a tubular reactor comprising a catalyst-filled reactor tube disposed in a reservoir of circulating heat-exchange fluid (see section

[0044] and FIG. 2),

wherein the catalyst in the reactor tube includes at least one monolithic catalyst or catalyst support structure (see FIG. 1), the monolithic structure being formed of a heat-conductive material characterized by a first average linear coefficient of thermal expansion (e.g., a metal such as aluminum, copper; see sections [0020], [0036];

wherein the reactor tube is formed of a heat conductive material characterized by a second average linear coefficient of thermal expansion (e.g., a metal such as nickel; see section [0044]); and

wherein the first average linear coefficient of thermal expansion is greater than the second average linear coefficient of thermal expansion, as evidenced by Applicant's disclosure (at section [0053] of the specification):

> "Examples of tube and monolith construction materials providing a *positive monolith-tube thermal expansion differential* include monoliths composed of *aluminum or copper* mounted within reactor tubes composed of *nickel* or steel."

The tubular reactor in FIG. 2 is a pilot-scale reactor comprising a single catalyst-filled reactor tube. Carmello et al., however, discloses that, in industrial practice, the tubular reactor conventionally comprises multiple catalyst-filled reactor tubes (see, e.g., section [0025]). Accordingly, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the tubular reactor of Carmello et al. to comprise multiple catalyst-filled reactor tubes, on the basis of suitability for industrial practice. Furthermore, the duplication of parts for multiplied effect was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960).

Although the "operating gap distance" is not specifically calculated by Carmello et al.,

the tubular reactor of Carmello et al. inherently meets or is obvious over the claimed limitation of an operating gap distance that "does not exceed about 250 μm". In particular, it is noted that Carmello et al. discloses,

> "... The monolith should be *in contact* with the fixed fed reactor tube walls in such a way as to provide sufficient heat removal." (see section [0019]; also, see claim 25).
>
> "Each monolith had a cylindrical shape... *its external diameter (d) being the same as the internal diameter of the reactor tubes...*" (see section [0037]).

Thus, the operating gap distance (Gap_{op}) appears to approximately equal zero.

Furthermore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to minimize the operating gap distance in the tubular reactor of Carmello et al. (i.e., such that it did not exceed about 250 μm), because the precise operating gap distance would have been considered a result effective variable by one having ordinary skill in the art.

Groppi et al., for instance, teaches that the effective radial thermal conductivity in a catalyst bed may be enhanced by providing an intimate contact and by increasing the contact area between the monolith structure and the internal reactor tube wall (see page 73, item 2).

Accordingly, one having ordinary skill in the art would have routinely optimized the operating gap distance in the tubular reactor of Carmello et al., by providing an intimate contact and by increasing the contact area between the monolith structure and the internal reactor tube wall as taught by Groppi et al., to thereby obtain the desired degree of radial thermal conductivity of the catalyst bed, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 3, Carmello et al. further discloses that the reactor tube may comprise multiple monolithic catalyst or catalyst support structures disposed within the tube in end-to-end thermal contact with one another (see section [0024]; also, FIG. 2).

Regarding claims 4 and 5, Carmello et al. is silent as to the operating gap distance between the reactor tube and the monolith catalyst support structure being varied along the length of the reactor tube and/or about the circumference of the reactor tube. However, as is well known in the art, manufacturing tolerances will often dictate that the monolith catalyst support structures being produced will not be exactly identical to one another, and that the shape of the monolith catalyst support structures will not exactly conform to the shape of the reactor tube in which the support structures are to be inserted. Thus, one having ordinary skill in the art would recognize that, in practice, there would exist at least some slight variation in operating gap distance between the reactor tube and the monolithic catalyst support structure, along the length of the reactor tube and/or the circumference of the reactor tube.

Furthermore, it is noted that Groppi et al. teaches that heat transfer across the interface between the monolith catalyst and the internal reactor tube wall,

> "... could be optimized both by favoring an intimate contact between the surfaces and by incrementing the contact area, which, however, involves improvements in the geometry and configuration of the structured catalysts." (see page 73, under item 2).

From this teaching, one having ordinary skill in the art would have recognized that the heat transfer efficiency to or from the catalyst bed could be customized for a particular reaction by changing the amount of contact area at the interface between the monolith catalyst support structures and the internal reactor tube wall, e.g., by modifying the geometry and configuration of the support structure.

Accordingly, it would have been obvious for one of ordinary skill in the art at the time the invention was made to vary the operating gap distance between the monolith catalyst support structure and the wall of the reactor tube along the length of the reactor tube and/or about the circumference of the reactor tube in the modified apparatus of Carmello et al., by either increasing or decreasing the amount of contact area at the interface by modifying the geometry and configuration of the structured support, in order to optimize the efficiency of heat transfer to or from the catalyst bed along the length of the reactor tube and/or about the circumference of the reactor tube, as suggested by Groppi et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer A. Leung
November 27, 2007